AYK REGION
STOCK STATUS REPORT # 9

RECENT DEVELOPMENTS IN THE BERING SEA CHINOOK SALMON FISHERY

by

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WESTERN ALASKA FISHERY

Introduction

The description and status of the salmon runs and fisheries along Alaska's Bering Sea coast (Unimak Pass to Cape Prince of Wales) was reported in INPFC Documents 1134 and 1135. Substantial utilization is made of chinook salmon in this region with the annual harvest averaging 323,000 during 1965-1973. The major fisheries are located in the Nushagak district in Bristol Bay and in the Kuskokwim and Yukon Rivers.

Chinook salmon catches made in this region during the past two years were below average, 291,000 in 1972 and 238,000 in 1973. The catch and estimated run in 1973 were the smallest since 1960.

Bristol Bay

Catch and escapement data for the Nushagak district indicate the 1972 and 1973 runs were the smallest of the 1966-1973 period (Table 1). Escapement data on which to estimate total run size was not available prior to 1966.

Commercial chinook catches by district for Bristol Bay from 1960-1973 are given in Table 2 which shows the dominance

of the Nushagak run in the Bristol Bay total catch.

Kuskokwim River

Due to increases in effort, various fishing time restrictions have been implemented over the past several years. As a result the catch data shown in Table 3 do not necessarily reflect salmon abundance. Escapement indices for 1972 and 1973 were low (Table 4).

Yukon River

The 1973 commercial catch was the smallest since statehood and was about 28,000 below the 1961-1972 average (Table 5). Due to the indicated small run, the main commercial fishery in 1973 was closed June 27, the earliest closure since 1961 for a run of normal timing. Escapement indices in 1973 were fair at best, but were the smallest ever recorded in some areas (Table 6).

HIGH SEAS FISHERY

Table 7 gives the chinook salmon catches in the mothership fishery by year and reporting area for 1952-1972. The landbased drift gill net and longline fishery catches are also shown. This latter fishery occupies the area south of the mothership fishery east to 175° W. long. No historical data are available on catch by area for the landbased fishery.

The total mothership catch has increased approximately four-fold in recent years--from 69,000 annually (1952-1963) to 305,000 annually (1964-1972). The catch of 554,000 made in 1969 was the largest ever recorded. The Bering Sea portion of the catch has increased even more, or about nine-fold in recent years--from 24,000 annually (1952-1963) to 226,000 a annually (1964-1972). Over 90 percent of the total mothership catch was taken in the Bering Sea in 1970.

Catches in the vicinity of the Abstention Line (175° W long.) have also steadily increased in the Bering Sea, until in 1970, 41 percent of the total catch was taken between 180°-175° W long. and 79 percent between 175° E and 175° W long. Figure 1 shows the total mothership chinook salmon catch, 1952-1970, by 2 x 5° area.

The mothership chinook salmon catch in the Bering Sea is compared to the total Western Alaska chinook catch (commercial plus subsistence) for 1960-1972 in Table 8. Since 1964 the high seas catch has exceeded the Western Alaska inshore catch in two years: 1969 and 1970. The total high seas mothership Bering Sea chinook catch from 1964-1972 was 2,036,000 while the total Western Alaska catch for this period was 2,983,000.

CONTINENT OF ORIGIN OF HIGH SEAS CATCH

Tagging

Figure 2 shows chinook salmon tag recoveries from releases made in the mothership fishing area. Detailed tag release and recovery information is given in Table 9. Mainland recoveries (7) range from the Columbia River north to the Yukon River. Mainland recoveries of only Bering Sea releases (4) have all been from western Alaska.

In addition to the mainland recoveries, nine tagged chinook have been recovered in the high seas mothership fishery. These are also shown in Figure 2 and are indicated by broken lines. Direction of movement can be used to determine continent of origin only for those fish known to be matures at time of recovery with the possible exception of immature fish demonstrating substantial westward migration. One fish tagged at 56°02' N, 176°00' W and recovered at 58°43' N 166°00' E near the Kamchatka coast one year later was only two-ocean at time of recovery and may have been immature. In any case it is the only recovery from tagging in the Bering Sea showing any substantial indication of Asian origin. One other fish tagged at 60°03' N, 175°00' E and recovered at 58°37' N, 168°58' E was immature at time of recovery.

There is a total lack of tag recoveries from landbased high seas fishing areas although in some years chinook catches in this fishery are substantial.

The number of chinook recoveries is obviously inadequate for definitive assignment to continent of origin of the high seas catch. There is little evidence, however, of a substantial number of Asiatic fish in recent North Pacific or Central Bering Sea catches.

Comparison of High Seas and Asiatic Coastal Catches

Table 10 shows Asian coastal in addition to high seas mothership and landbased catches since 1911. These catches are graphically presented in Figure 3. Present Asiatic coastal catches are similar to historical levels. Although early catch data is questionable, there is no indication that the coastal fishery ever approached present catch magnitudes (coastal and high seas combined). This is further evidence that recent high seas catch are primarily composed of North American chinook of western Alaska origin.

MANAGEMENT IMPLICATIONS

Western Alaska chinook salmon are an intensively managed species. Fishing time has been substantially reduced in most districts over the past ten years to achieve needed escapements in the face of rising gear levels. It is becoming obvious that in recent years an increasing proportion of western Alaska chinook runs are being subjected to high seas fishing pressure by the Japanese mothership fleet in the Bering Sea. Due to the lack of definitive information on continent of origin of chinook salmon in the mothership fishing area, we feel that these harvests pose a serious threat to the proper management of western Alaska chinook salmon stocks.

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Table 1. Nushagak district (Bristol Bay) chinook salmon catch and escapement data, 1961-1973. 1/ 3/

Year	Commercial Catch	Subsistence Catch	Total Catch	Total Estimated Escapement 2/	Total Estimated Run
1961	60,953	-	-	-	-
1962	61,283	-	-	-	-
1963	45,979	3,600	49,579	-	-
1964	108,606	2,900	115,506	-	-
1965	85,910	4,600	90,510	-	-
1966	58,184	3,700	61,884	35,000	96,884
1967	96,240	3,700	99,940	40,000	139,940
1968	78,201	6,600	84,801	60,000	144,801
1969	80,803	7,100	87,903	30,000	117,903
1970	87,547	6,900	94,447	40,000	134,447
1971	82,769	4,400	87,169	-	-
1972	46,119	3,500	49,619	25,000	74,619
1973	30,599	8,000 est.	38,599 est.	40,000	78,599

1/ ADF&G Annual Management Report, Bristol Bay area, 1971.
2/ Based on aerial surveys, tower counts and upriver catches.
3/ Preliminary data.

Table 2. Bristol Bay chinook salmon, commercial catch by district, 1960-1973.[1/]

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1960	17,778	2,991	2,209	81,416	7,309	111,703
1961	10,206	3,266	3,483	60,953	10,748	88,656
1962	8,816	2,070	2,929	61,283	8,949	84,047
1963	4,713	2,355	3,030	45,979	6,192	62,269
1964	12,902	3,618	3,694	108,606	10,716	139,536
1965	9,793	2,313	4,042	85,910	10,909	112,967
1966	5,456	1,949	1,916	58,184	9,967	77,472
1967	3,705	2,285	1,582	96,240	13,381	117,193
1968	6,398	3,472	2,153	78,201	13,499	103,723
1969	19,016	2,801	2,107	80,803	20,181	124,908
1970	19,037	3,765	1,498	87,547	28,664	140,511
1971	10,254	2,187	779	82,769	27,026	123,015
1972[2/]	2,269	1,026	166	46,119	19,539	69,119
1973[2/]	846	1,327	22	30,599	10,838	43,632
Total	131,189	35,425	29,610	1,004,609	197,918	1,398,751

1/ ADF&G Annual Management Report, Bristol Bay area, 1971.
2/ Preliminary data.

Table 3. Kuskokwim River chinook salmon catch data, 1961-1973.[1/]

Year	Commercial Catch	Subsistence Catch	Total Catch
1961	18,918	31,136	50,054
1962	15,341	14,656	29,997
1963	12,016	34,615	46,631
1964	17,149	29,017	46,166
1965	21,989	27,143	49,132
1966	25,545	49,606	75,151
1967	29,986	57,875	87,861
1968	34,278	30,230	64,508
1969	43,997	40,138	84,135
1970	39,290	69,219	108.509
1971	40,274	42,926	83,200
1972[2/]	40,795	40,145	80,940
1973[2/]	~~30,838~~ 32,838	~~35,000~~ 38,526	~~65,838~~ 71,364
Averages: 1961-73	~~28,493~~	~~38,592~~	~~67,085~~
Averages: 1969-73	~~39,038~~	~~45,485~~	~~84,523~~

1/ ADF&G Annual Management Report, Arctic-Yukon-Kuskokwim area, 1971.

2/ Preliminary data.

Table 4. Index counts of Kuskokwim River chinook salmon spawning escapements, 1965-1973.[1/]

Year	Aerial Surveys				Counting Tower
	Kisaralik River	Aniak River (Above Salmon R.)	Chukowan River	Kogrukluk River	Kogrukluk River
1965	194[2/]	-	-	-	-
1966	204[2/]	485	986	1,645	-
1967	-	758[2/]	-	1,033	-
1968	487	783	1,260	2,180	-
1969	-	537	-	-	3,626
1970	531	592	1,118	1,598	4,865
1971	-	144[2/]	-	636[2/]	-
1972[3/]	-	93[2/]	163[2/]	476[2/]	2,305
1973[3/]	152	200[2/]	229	610[2/]	1,718

1/ ADF&G Annual Management Report, Arctic-Yukon-Kuskokwim area, 1971.
2/ Surveys rated poor.
3/ ADF&G unpublished data.

Table 5. Yukon River chinook salmon catch data, 1961-1973.[1/]

Year	Commercial Catch	Subsistence Catch	Total Catch	Commercial Catch Per Unit Effort[3/]
1961	123,110	31,364	154,474	1.05
1962	98,773	21,610	120,383	0.73
1963	119,331	32,970	152,301	1.09
1964	96,795	16,171	112,966	1.11
1965	120,279	19,608	139,887	1.04
1966	95,257	14,272	109,529	0.95
1967	131,617	19,448	151,065	0.89
1968	108,738	15,006	123,744	0.81
1969	92,360	15,000	107,360	0.76
1970	81,912	16,410	98,322	0.91
1971	113,685	25,251	138,936	1.11
1972[5/]	94,609	19,541	114,150	0.86
1973[5/]	77,224 ~~77,317~~	~~4/~~ 22,215	4/ 99,439	0.66
Averages: 1961-73	~~104,137~~			
Averages: 1969-73	~~91,976~~			

1/ Includes catches from Yukon Territory (Canada).
2/ ADF&G Annual Management Report, Arctic-Yukon-Kuskokwim area, 1971.
3/ CPUE during chinook salmon season in Yukon sub-districts 1 and 2 (lower 150 miles) 96 hours commercial fishing per week during 1961-1967; 84 hours per week during 1968-1973.
4/ Subsistence catches not available as of this date.
5/ Preliminary data.

Table 6. Index counts of Yukon River chinook salmon spawning escapements, 1960-1973.[1/4/]

Year	Andreafsky River (East fork)	Andreafsky River (West fork)	Anvik River Aerial Survey	Anvik River Counting Tower
1960	1,020	1,220	1,950	
1961	1,003	–	1,226	
1962	675[2/]	762[2/]	–	
1963	–	–	–	
1964	867	705	–	
1965	–	355[2/]	650[2/]	
1966	361	303	638	
1967	–	276[2/]	336[2/]	
1968	380	383	297[2/]	
1969	231[2/]	274[2/]	296[2/]	
1970	665	574[2/]	368[2/]	
1971[5/]	1,904	1,284	–	
1972[5/]	798	582[2/]	418	~~1,104~~ 1172
1973[5/]	825	788	222[2/]	~~668~~ 613
1974				

Year	Salcha River	Nisutlin River (Sidney-100 Mile Cr.)	Whitehorse Dam Fishway
1959	–	–	1,054
1960	1,660	–	660
1961	2,878	–	1,068
1962	937	–	1,500
1963	–	–	484
1964	450	–	587
1965	408	–	903
1966	800	–	563
1967	–	–	533
1968	735[2/]	407	407
1969	461[2/]	105	334
1970	1,882	615	625
1971	159[2/]	640[3/]	856
1972[5/]	1,193	317	392
1973[5/]	249	36[2/]	228

1/ With exception of Whitehorse fishway counts, the data was obtained from aerial surveys which were made only of the main stem of each river listed.

2/ Incomplete survey or poor survey conditions resulting in a very minimal count.

3/ Canadian Department of Fisheries survey.

4/ ADF&G Annual Management Report, Arctic-Yukon-Kuskokwim area, 1971.

5/ ADF&G unpublished data.

Table 7. Japanese high seas mothership catch of chinook salmon by area by year and landbased high seas catch in thousands of fish.[1/]

	North Pacific						Bering Sea								
Year	160-165E	165-170E	170-175E	175E-180	180-175W	North Pacific Total	160-165E	165-170E	170-175E	175E-180	180-175W	Bering Sea Total	Other	Mothership Total All Areas	Tota Landba
1952	1	-	-	-	0	1	-	0	0	0	0	-	0	1	
1953	3	-	-	-	0	3	-	0	0	0	0	-	0	3	
1954	44	11	2	-	0	57	0	0	0	0	0	0	17	74	28
1955	26	15	2	-	0	43	0	0	0	0	0	0	21	64	40
1956	31	14	25	2	-	72	0	-	1	8	36	45	9	126	22
1957	6	3	2	-	0	11	0	-	-	5	9	14	2	27	44
1958	17	17	3	-	0	37	0	0	0	0	0	0	9	46	61
1959	5	21	8	-	0	34	0	1	23	5	0	29	0	63	112
1960	9	19	9	1	-	38	0	9	11	15	107	142	0	180	187
1961	6	9	5	1	-	21	0	-	1	1	8	10	0	31	114
1962	11	78	30	2	1	122	0	0	0	-	0	-	0	122	201
1963	19	15	10	2	0	46	0	6	11	22	3	42	0	88	139
1964	8	24	86	50	38	206	0	18	60	85	41	204	0	410	275
1965	5	32	22	9	1	69	0	18	31	29	38	116	0	185	162
1966	5	27	45	6	3	86	0	44	12	28	38	122	0	208	191
1967	12	24	19	2	-	57	-	10	16	26	18	70	0	127	189
1968	6	19	19	11	14	69	1	30	65	153	44	293	0	362	154
1969	13	18	16	30	27	104	1	18	24	150	257	450	0	554	76
1970	4	7	5	7	10	33	-	4	55	165	180	404	0	437	139
1971	5	11	11	13	8	48	-	6	27	54	70	157	0	205	129
1972	9	19	4	2	1	35	2	9	40	102	67	220	0	261[3/]	
Totals	245	383	323	138	103	1,192	4	173	377	848	916	2,318	58	3,574[3/]	2,263

1/ Sources as in Table 9.
2/ Landbased catch from Table 9. Data available only through 1971.
3/ Total includes catches of less than 500 fish for some areas.

Table 8. Western Alaska chinook salmon catch by area compared to Japanese mothership catch in the Bering Sea.[5]

	Arctic-Yukon-Kuskokwim			Bristol Bay			North Peninsula	Total Western	Japanese mothers
	Commercial	Subsistence	Total	Commercial	Subsistence[3]	Total	Commercial	Alaska Catch	Bering Sea Catch
1960	73,560	19,457	93,017	111,073	(5,500)	116,573	10,441	220,031	142,000
1961	148,741	52,617	201,358	88,656	(5,500)	94,156	6,050	295,514	10,000
1962	122,907	33,506	156,413	84,047	(5,500)	89,547	6,098	245,960	-
1963	142,185	67,271	209,456	62,269	4,100	66,369	3,601	279,426	42,000
1964	116,835	54,235	171,070	139,536	3,400	142,936	3,592	317,598	204,000
1965	144,512	45,376	189,888	112,967	5,100	118,067	6,131	314,086	116,000
1966	120,692	63,576	184,268	77,472	4,300	81,772	9,342	275,382	122,000
1967	161,496	81,832	243,328	117,193	4,200	121,393	5,523	370,244	70,000
1968	150,728	50,591	201,319	103,723	7,100	110,823	4,483	316,625	293,000
1969	157,392	57,214	214,606	124,908	7,500	132,408	4,846	351,860	450,000
1970	147,204	88,306	235,510	140,511	7,250	147,761	3,854	387,125	404,000
1971	158,037	71,342	229,379	123,015	4,640	127,655	2,189	359,223	157,000
1972	152,748	63,688	216,428	69,119	4,032	73,151	1,800	291,379	220,000
1973[1]	125,987	56,000[2]	181,987	43,632	8,500	52,132	3,570[4]	237,689	

1/ Alaska catch data is preliminary, but general order of magnitude should not change.
2/ Subsistence catch data for Yukon River portion not available--four-year average used based on small variability in catches.
3/ No estimates of subsistence catch made prior to 1963 in Bristol Bay--eleven-year average used for 1960-1962. 1963-1969 catch estimated by interview and survey. 1970-1973 catches recorded from permits returned by fishermen.
4/ Preliminary estimate based on catch report comparisons by district with 1972.
5/ All inshore data compiled from ADF&G Annual Management Reports and unpublished data.

Table 9. Chinook salmon tag recoveries from high seas tagging west of 175° W long., 1956-1971.[1/]

Tag No.[2/]	TAGGING Area	Location	Year	Age	RECOVERY Location	Year	Maturity
Recovery in year of tagging							
1.	E6048	4854N 16018E	58	1.2	4645N 15724E	58	?
2.	W8050	5136N 17618W	64	1.3	Togiak R.-Bristol Bay	64	M
3.	W7556	5630N 17500W	69	1.2	5724N 17754W	69	I
Recovery in years subsequent to tagging							
4.	E6052	5335N 16300E	59	1.2	4420N 15640E	60	M
5.	E7560	6003N 17500E	65	1.2	5837N 16858E	66	I
6.	E7560	6003N 17500E	65	1.2	Nushagak Dist.-Bristol Bay	67	M
7.	E7558	5829N 17525E	65	-	Yukon River	67	M
8.	E7556	5601N 17700E	68	1.1	5931N 17800E	69	I
9.	E7556	5756N 17609E	59	1.2	Yukon River	60	M
10.	W8058	5800N 18000W	66	1.2	Kuskokwim River	68	M
11.	W8056	5602N 17600W	59	.1	5843N 16600E	60	?
12.	W8056	5602N 17600W	59	.1	5917N 18000W	60	?
13.	W8050	5140N 17545W	58	.1	4728N 17050E	60	?
14.	W8050	5118N 17628W	68	1.2	Southeastern Alaska	69	M
15.	W8050	5129N 17634W	56	-	Columbia River	57	M
16.	W8058	5830N 17605W	69	1.2	5813N 17838W	70	?

1/ Tag recovery data from INPFC Docs. 1377 and 1468.
2/ Keyed to Figure 2.

Table 10 Asian coastal and high seas chinook salmon catches in millions of fish.

Year	USSR[1]	Japan Coastal[2]	Kamchatka Mothership & N. Kuriles[2]	Landbased Coastal[3]	S. Kuriles Hokkaido & Honshu[3]	Total Coastal[4]	High Seas Mothership[5]	High Seas Landbased[6]	Total High Seas	Total
1908	-	-	-			-				-
1909	-	-	-			-				-
1910	-	-	-			-				-
1911	-	.006	-			.006				.006
1912	-	.005	-			.005				.005
1913	-	.028	-			.028				.028
1914	-	.012	-			.012				.012
1915	-	.018	-			.018				.018
1916	-	.015	-			.015				.015
1917	-	.015	-			.015				.015
1918	-	.012	-			.012				.012
1919	-	.051	-			.051				.051
1920	-	.070	-			.070				.070
1921	-	.065	-			.065				.065
1922	-	.036	-			.036				.036
1923	-	.025	-			.025				.025
1924	-	.024	-			.024				.024
1925	-	.040	-			.040				.040
1926	-	.077	-			.077				.077
1927	-	.098	-			.106				.106
1928	-	.069	-			.087				.087
1929	-	.083	-			.109				.109
1930	-	.112	.003			.179				.179
1931	-	.075	.005			.115				.115
1932	-	.075	.003			.128				.128
1933	-	.036	.001			.051				.051
1934	-	.069	.003			.092				.092
1935	-	.103	.020			.144				.144
1936	-	.077	.042			.142				.142
1937	-	.123	.031			.154				.154
1938	-	.091	.029			.120				.120
1939	-	.058	.009			.067				.067
1940	.021	.067	.012			.100				.100
1941	.055	.067	.013			.135				.135
1942	.035	.031	.016			.082				.082

Table 10 (Continued) Asian coastal and high seas chinook mon catches in millions of fish.

Year	USSR[1]	Japan Coastal[2]	Kamchatka Mothership & N. Kuriles[2]	Landbased Coastal[3]	S. Kuriles Hokkaido & Honshu[3]	Total Coastal[4]	High Seas Mothership[5]	High Seas Landbased[6]	Total High Seas	Total
1943	.047	-	.005	-		.052	-	-	-	.052
1944	.016	-	-	-		.016	-	-	-	.016
1945	.037	-	-	-		.037	-	-	-	.037
1946	.079	-	-	-		.079	-	-	-	.079
1947	.079	-	-	-		.079	-	-	-	.079
1948	.126	-	-	-		.126	-	-	-	.126
1949	.073	-	-	-		.073	-	-	-	.073
1950	.060	-	-	-		.060	-	-	-	.060
1951	.070	-	-	-		.070	-	-	-	.070
1952	.064	-	-	-		.064	.001	-	.001	.065
1953	.085	-	-	-		.085	.003	-	.003	.088
1954	.063	-	-	-		.063	.074	.028	.102	.165
1955	.130	-	-	-		.130	.064	.040	.104	.234
1956	.106	-	-	-		.106	.126	.022	.148	.254
1957	.087	-	-	-		.087	.027	.044	.071	.158
1958	.068	-	-	-		.068	.046	.061	.105	.173
1959	.095	-	-	-		.095	.063	.112	.175	.270
1960	.068	-	-	-		.068	.180	.187	.367	.435
1961	.063	-	-	-		.063	.031	.114	.145	.208
1962	.100	-	-	-		.100	.122	.201	.323	.423
1963	.124	-	-	-		.124	.088	.139	.227	.351
1964	.160	-	-	-		.160	.410	.275	.685	.845
1965	.107	-	-	-		.107	.185	.162	.347	.454
1966	.093	-	-	-		.093	.208	.191	.399	.492
1967	.091	-	-	-		.091	.127	.189	.316	.407
1968	.083	-	-	-		.083	.362	.154	.516	.599
1969	.122	-	-	-		.122	.554	.076	.630	.752
1970	-	-	-	.007		-	.437	.139	.576	-
1971	.183	-	-	.022		.205	.206	.129	.335	.540
1972	-	-	-	-		-	.261	-	-	-

1/ 1940-1953 INPFC Bulletin 12; tons converted to fish on basis of Table 32 average weights; 1954-1968 Fredin (71) unpublished; 1969-1971 INPFC Stat. Yearbook;

2/ INPFC Bulletin 12.

3/ Prior to 1970 no catches given in any source; 1970-1971 INPFC Stat. Yearbooks.

4/ 1908-1926 only Japanese catches given; 1927-1936 INPFC Bulletin 12; 1937-1953 totals of data shown; 1954-1968 Fredin (71) unpublished; 1969 and 1971 totals of data shown.

5/ 1952-1959 INPFC Bulletin 15; 1960-1971 INPFC Stat. Yearbook; 1972 INPFC Doc. 1629.

6/ 1954-1968 Fredin (71) unpublished; 1969-1971 INPFC Stat. Yearbook landbased longline and drift gill net.

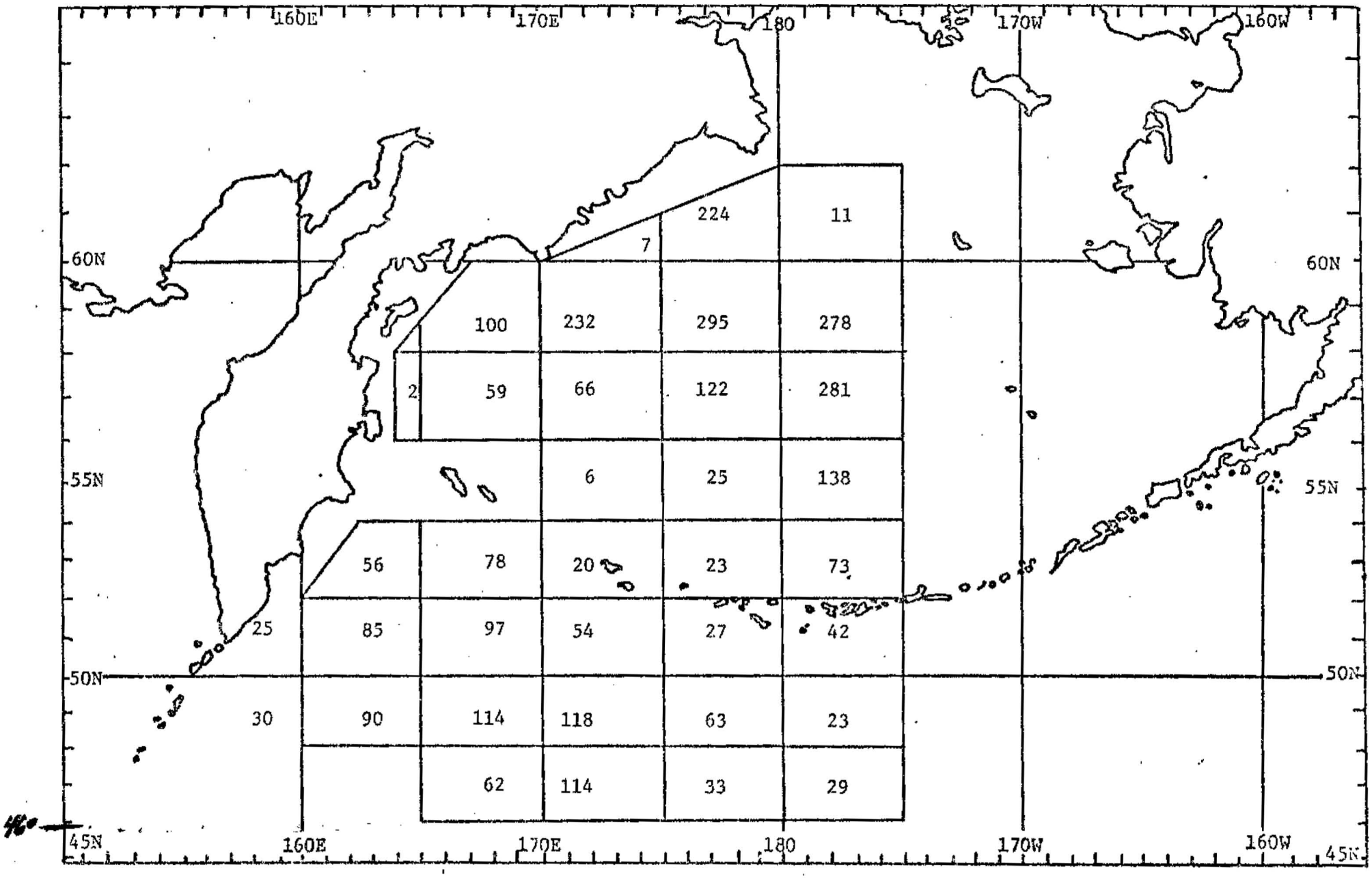

Figure 1. Japanese high seas mothership catch of chinook salmon, 1952-1970, in thousands of fish.

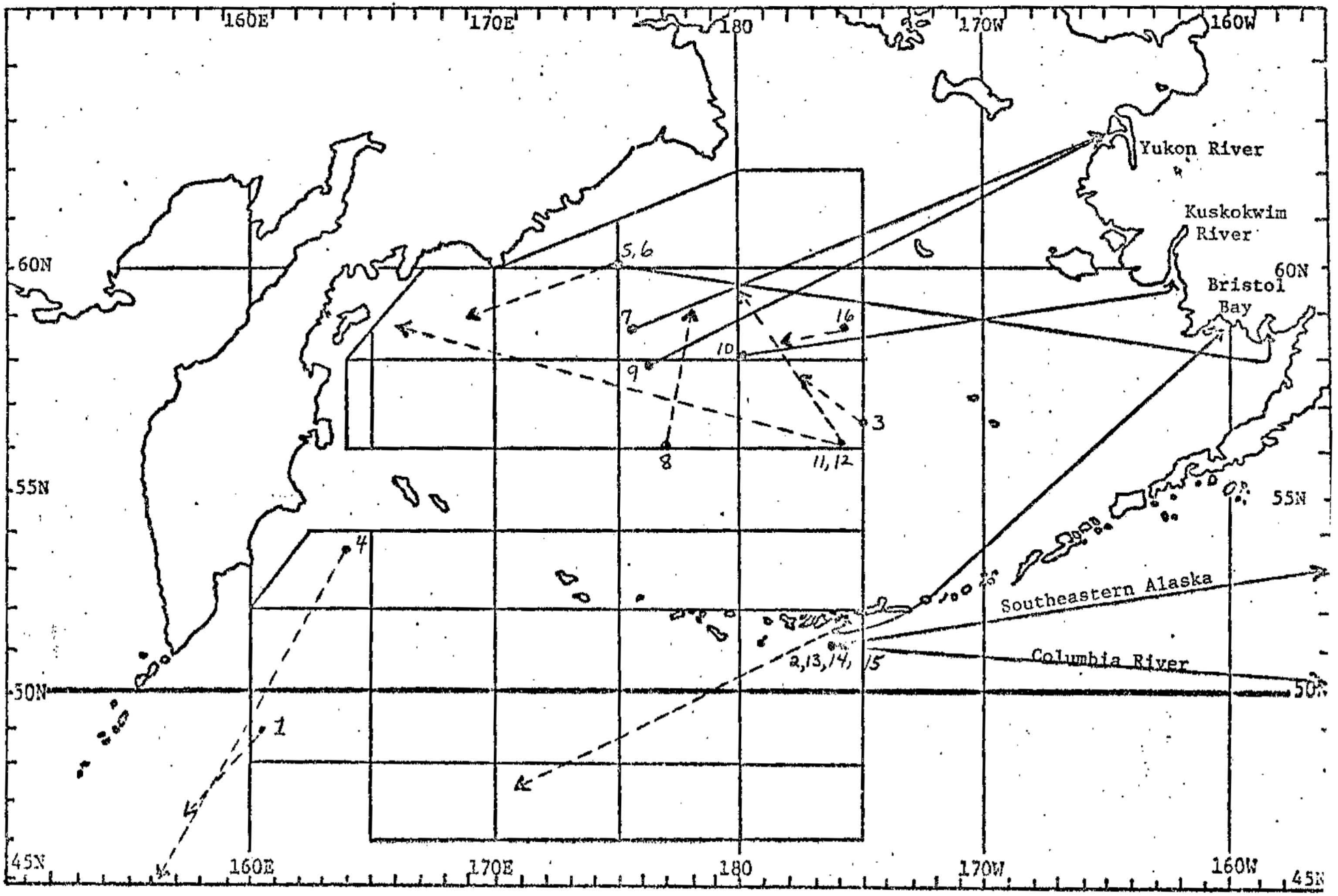

Figure 2. Chinook salmon tag recoveries from high seas tagging through 1971. Mainland recoveries shown with solid line, high seas recoveries--broken line. Numbers keyed to Table 9.

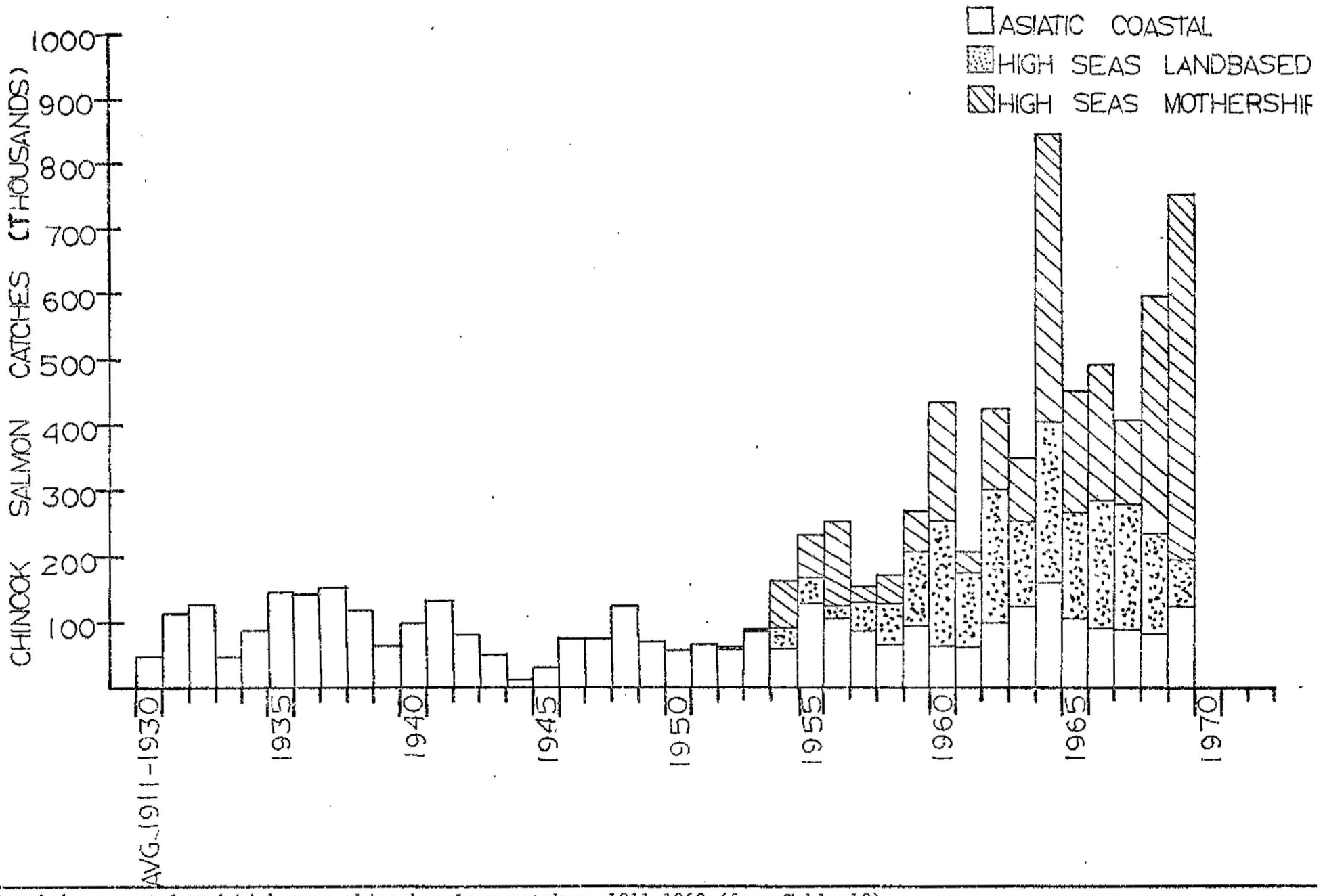

Figure 3. Asian coastal and high seas chinook salmon catches, 1911-1969 (from Table 10).